

CLAIMS

1. A modular expandable apparatus comprising at least one base module (100), the base module including:

5 a broad-band data communication device (200) for handling communications with an external data communication network (150) through a broad-band data communication channel (103);

10 at least one local network port (225) for the connection to a local data communication network;

a local network interface device (210) adapted to handling communications with the local data communication network and coupled to the local network port through a local network communication bus (230), the local network  
15 interface having a media independent interface (215) and a disable input (252);

a data processing unit (200) interacting with the broad-band data communication device and interacting with the local network interface device through a media  
20 independent interface bus (220) connected to the media independent interface thereof, for enabling intercommunication between the local network and the external network;

a disable signal line (257) coupled to the disable  
25 input of the local network interface device and adapted to drive the local network interface device into a disabled state in which the local network interface device does not engage the media independent interface bus and the local network port;

30 an expansion bus (260) allowing expandability of the apparatus by connecting at least one expansion module to the base module, the expansion bus comprising the media independent interface bus, the local network communication bus (230) and the disable signal line.

2. The modular expandable apparatus of claim 1, in which the local network is an Ethernet network, and the local network interface device comprises an Ethernet physical layer transceiver.

3. The modular expandable apparatus of claim 1 or 2, in which the broad-band data communication device is an xDSL data communication device.

4. The modular expandable apparatus of claim 3, in which the broad-band data communication device is implemented by the data processing unit.

5. The modular expandable apparatus of any one of claims 1-4, in which the base module further comprises a data processing unit bus (220) connected to the data processing unit, and being part of the expansion bus.

6. The modular expandable apparatus of claim 5, in which the base module comprises at least one expansion connector (250) connected and allowing access to the expansion bus.

7. The modular expandable apparatus of claim 6, comprising at least one expansion module (105a;105b;105c), the expansion module comprising at least one input expansion connector (300;400;500) matching the expansion connector of the base module.

8. The modular expandable apparatus of claim 7, in which the at least one expansion module further comprises an output expansion connector (305;405;505) matching the input expansion connector.

9. The modular expandable apparatus of claim 8, in which the data processing unit bus, the media independent interface bus, the local network communication bus and the disable line is propagated from the input expansion  
5 connector to the output expansion connector of the expansion module.

10. The modular expandable apparatus of claim 8, in which the data processing unit bus is propagated from the  
10 input expansion connector to the output expansion connector of the expansion module, while the media independent interface bus, the local network communication bus and the disable line are not propagated to the output expansion connector.

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11. The modular expandable apparatus of claim 10, in which the at least one expansion module comprises an expansion module including an Ethernet switch (310;410).

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12. The modular expandable apparatus of claim 11, in which the Ethernet switch comprises a media independent interface (315;415) which, when the input expansion  
connector of the expansion module is connected to expansion  
connector of the base module, interacts with the data  
25 processing unit through the media independent interface bus of the expansion bus.

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13. The modular expandable apparatus of claim 12, in which the expansion module drives the disable line to a  
disable state for disabling the local network interface  
device of the base module.

14. The modular expandable apparatus of claim 13, in which the Ethernet switch comprises:

at least one first Ethernet port (320a-320d;420b-420d) connected to a respective local network connector (325a-325d) through a respective first local network communication bus (330a-330d);

5 a second Ethernet port (320e;420e) connected through a second local network communication bus (330e;430e) to the input expansion connector, for the connection to the local network communication bus of the expansion bus; and

10 a third Ethernet port (320f;420f) connected through a third local network communication bus (330f;430f) to the output expansion connector.

15 15. The modular expandable apparatus of any one of claims 11 to 14, in which the Ethernet switch includes at least one optical Ethernet port (420a), connected through a respective optical Ethernet communication bus (430a) to an optical transceiver (437) of the expansion module.

20 16. The modular expandable apparatus of claim 8, in which the at least one expansion module comprises a wireless local area network expansion module.

25 17. The modular expandable apparatus of claim 8, in which the at least one expansion module comprises a power line transmission expansion module adapted to allow communication over an AC power line.

30 18. The modular expandable apparatus of claim 7, in which the base module comprises a power supply input (240) for receiving an unregulated power supply, and at least one first power supply regulator (235) for generating a first regulated power supply from the unregulated power supply, the first regulated power supply supplying the data processing unit and the local network interface device, and

in which the expansion bus comprises unregulated power supply distribution lines, the at least one expansion module comprising at least one respective second power supply regulator (350;450;550) generating a second regulated power supply from the unregulated power supply.

19. A method of expanding a modular apparatus adapted to allow intercommunication between a local data communication network and an external data communication network, the modular apparatus comprising a base module (100) including:

a broad-band data communication device (200) for handling communications with the external data communication network through a broad-band data communication channel (103);

at least one local network port (225) for the connection to a local data communication network;

a local network interface device (210) adapted to handling communications with the local data communication network and coupled to the local network port, the local network interface device having a media independent interface (215);

a data processing unit (200) interacting with the broad-band data communication device and interacting with the media independent interface of the local network interface device, for enabling intercommunication between the local network and the external network,

the method comprising:

coupling to the base module at least one expansion module (105a;105b) including at least one expansion local network port (325a-325d;425b-425d,425g) for the connection to the local data communication network, and an expansion local network interface device (310;410) coupled to the expansion local network ports and having a media independent

interface (315;415);

disabling the local network interface device of the base module;

controlling the expansion local network interface device by means of the data processing unit of the base module through the media independent interface of the expansion local network interface device; and

coupling the at least one local network port of the base module to the expansion local network interface device.

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20. An expansion module for the modular expandable apparatus of claim 1, comprising:

an expansion local network interface device (310;410) adapted to handling communications with the local data communication network, the expansion local network interface device having an expansion media independent interface (315;415);

an expansion media independent interface bus (335;435) connected to the expansion media independent interface;

an expansion local network communication bus (330e;430e) connected to the expansion local network interface device;

an expansion bus connection scheme (300,380,GND;400,480,GND) for the connection of the expansion module to the expansion bus, the expansion bus connection scheme being adapted to:

connect the expansion media independent interface bus to the media independent interface bus of the expansion bus;

connect the expansion local network communication bus to the local network communication bus of the expansion bus, and

drive the disable signal line of the expansion bus to a state corresponding to a disabled state of the local network interface device.

21. A local communication network allowing to interconnect user appliances, including a modular expandable apparatus according to any one of claims 1-18.